PATENT ABSTRACTS OF JAPAN

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(54) ADHESIVE TAPE FOR SEMICONDUCTOR

(57)Abstract:

PURPOSE: To provide an adhesive tape for a semiconductor which enables the transfer mold mounting or the wire bonding mounting of a tape for TAB excellent in bonding property or a tape for TAB, which was hard to mount in the past, by preventing the conversion or deterioration at high temperature of an adhesive.

CONSTITUTION: This is an adhesive tape for a semiconductor provided, on the insulating film 1, with an adhesive layer 2 and a protective layer 3, and in which the Young's modulus after hardening at 20°C-300°C of the adhesive layer is 4×108dyne/cm2 or over.

LEGAL STATUS

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention is set like the erector of a semiconductor device, and relates to the adhesive tape for semi-conductors which consists of a sheet which connects the protection film used for the TAB (Tape Automated B-onding) method which attracts attention on the occasion of the formation of many pins of a device, a miniaturization, and high density assembly, adhesives, the tape for TAB which consists of a three-tiered structure of an insulating film, the tape for leadframe immobilization, and a leadframe and a TAB tape by wire bonding.
[0002]
[Description of the Prior Art] Conventionally, the tape for TAB is processed as follows and formed.
1) A stamping punches a sprocket device hole.
2) Stiffen adhesives with heating after carrying out thermocompression bonding of the copper foil to the punched tape.
3) Develop negatives after applying a photoresist and irradiating ultraviolet rays etc. through a mask.
4) Perform backing of a device hole, copper etching, resist removal, and removal of backing, produce a circuit, and apply a solder resist.
5) Perform tin and gold plate.
After inner lead bonding of the chip is carried out to the tape produced through the above process, a lead is cut, outer lead bonding is carried out to a printed circuit board etc., and it closes by resin. Or after carrying out inner lead bonding, it closes by resin, and outer lead bonding is cut and carried out also including a circumference circuit.
[0003]
[Problem(s) to be Solved by the Invention] The adhesives of the tape for TAB used conventionally have the following problems about the property at the time of an elevated temperature.
1) The fall of the adhesive strength to an inner lead and the organic insulation film under the elevated temperature at the time of outer lead bonding.
2) A location gap of the inner lead edge pattern under the elevated-temperature high pressure at the time of inner lead bonding.
3) Subduction by the adhesives layer of the outer lead under the elevated-temperature high pressure at the time of outer lead bonding.
4) The fall of the adhesive strength by adhesives degradation which takes place from the elevated-temperature cure of the long duration at the time of mold resin hardening towards mold-ization of the tape for TAB.
5) The adhesive agent of the wire by adhesives softening at the time of an elevated temperature at the time of wire bonding of the tape for TAB.
[0004] In the tape production process for present condition TAB, poor bonding is generated and it has become the cause of a yield fall from the above troubles. Moreover, by the mounting approaches, such as wire bonding using the tape for TAB, on the present tape for TAB, mounting is difficult and is not put

in practical use. This invention aims at solving the above problems in the conventional tape for TAB. That is, the purpose of this invention prevents softening at the time of the elevated temperature of adhesives, and degradation, and is to offer the tape for TAB which enabled transfer mold mounting of the tape for TAB excellent in the bonding property, and the tape for TAB which was hard to realize with the conventional adhesives, and wire-bonding mounting on the tape for TAB.
[0005]
[Means for Solving the Problem] The Young's modulus after hardening [in / were made in order that this invention might solve the above-mentioned trouble, and the outline comes to prepare an adhesives layer and a protective layer on an insulating film, and / 20 degrees C - 800 degrees C of this adhesives layer] is 4x108 dyne/cm2. It is the adhesive tape for semi-conductors characterized by being above.
[0006] The laminating of the protection film 3 which drawing 1 is the typical sectional view of the tape for TAB which is one example of this invention, and serves as the adhesives layer 2 and a protective layer at one side of insulating Ferrum 1 is carried out one by one. In drawing 1 , although the adhesives layer 2 shows what was made into 1 layer structure, you may have the lamination more than two-layer. As an insulating film, the insulating film which consists of compound heatproof films, such as heat-resistant plastic film, such as 50-125-micrometer polyimide, polyether imide, polyphenylene sulfide, and a polyether ether ketone, and epoxy resin-glass fabrics, epoxy resin-polyimide-glass fabrics, preferably can be used 25-188 micrometers in thickness.
[0007] Moreover, the adhesives layer which constitutes this invention is a heat-curing mold, needs to be semi-hardening-like and contains at least one sort of maleimide resin as a thermosetting component. It sets at 20 degrees C - 300 degrees C, and the Young's modulus of the adhesives layer after hardening is 4x108 dyne/cm2. It is required to hold more than. In this case, hardening which can be set means performing at 60 degrees C and performing multistage type heating of 5 hours one by one at 8 hours and 160 degrees C by 80 degrees C for 6 hours. Measurement of the Young's modulus as used in the field of this invention uses LEO Vibron DDV-II (product made from cage ETTEKKU) as a measuring device, measures it as a Measuring condition in the oscillation frequency of 110Hz, and the programming rate of 3 degrees C / min, and is specified as a dynamic modulus (E') based on the predetermined calculation approach.
[0008] Since this adhesives layer touches an insulating film directly, a high adhesive property is shown at the time of an elevated temperature, and it is required that it should have a high adhesive property with copper foil and the chemical resistance which was excellent to the drug solution put at the time of tape processing for TAB. In order to fill such a demand, the hardening component for carrying out heat curing to the elastomer component which secures flexibility to an adhesives layer in this invention is made to contain.
[0009] In this invention, it is desirable to use together at least one sort of thermoplastics, such as polyamide resin, polyester resin, NBR and SBR, and polyvinyl-acetal resin, as a component which gives flexibility to the adhesives layer after the above-mentioned hardening. Moreover, thermoplastics can be independently used as an adhesives layer. In order that it polyamide resin not only gives flexibility, but may act on the adhesives layer before and behind hardening as a curing agent of an epoxy resin, it is desirable especially to make an adhesives layer contain polyamide resin. Well-known various things can be used as polyamide resin. Especially, especially since amine ** acts effectively as a curing agent of an epoxy resin and shows the effectiveness of the adhesive strength of the adhesives after hardening, chemical resistance, and heat-resistant improvement, 3.0 or more (preferably 5-50) polyamide resin has it. [desirable] As polyamide resin which can be used in this invention, an aliphatic series polyamide and aromatic polyamide are raised, the range of molecular weight is 1,000-150,000, and the thing of the range whose softening temperature is 50-180 degrees C is used.
[0010] In this invention, the amount of the polyamide resin used has the desirable rate of polyamide resin 8 - the 100 weight sections to the thermosetting component 100 weight section in a system. Hardening becomes inadequate [under 8 weight sections], and exceeding the 100 weight sections, if many, it will become the addition which is unrelated to heat curing. The hardening component of the adhesives layer in this invention has a functional group in the structure, and the component which causes

and hardens this component and other components, and a reaction can be used for it. For example, an epoxy compound, a phenolic compound, a maleimide compound, etc. can be raised. It is the Young's modulus after hardening of the adhesives layer of this invention 4x108 dyne/cm2 In order to carry out above, a means to blend the constituent which blends said hardening component so much, or has the high thermal resistance like a maleimide compound or a phenolic compound can attain. Even if the epoxy compound needs to contain two or more epoxy groups in 1 molecule and contains a hydroxyl group, an alkoxy group, and a vinyl group in addition to an epoxy group, it does not interfere.

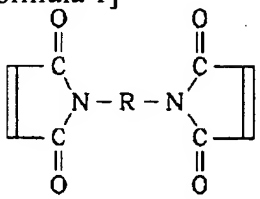
[0011] Specifically Allyl glycidyl ether, butyl glycidyl ether, Glycidyl methacrylate, 3, the 4-epoxy-6-methylcyclohexyl methyl -3, 4-epoxy-6-methylcyclohexane carboxylate, Vinyl cyclohexene carboxylate, vinylcyclohexene dioxide, Dipentene dioxide, dicyclopentadiene dioxide, a screw (3, 4-epoxy-6-methylcyclohexyl methyl) horse mackerel peat, Tetrahydrophtal acid diglycidyl ester, a phenol novolak epoxy resin, The bisphenol A mold epoxy resins, such as bisphenol A diglycidyl ether obtained from triglycidyl isocyanurate bisphenol A and epichlorohydrin, The epoxy compound which carried out partial denaturation of epoxidation cresol novolak resin and the above-mentioned epoxy compound with the fatty acid is illustrated. Furthermore, various elastomer modified epoxy resins, such as the epoxy compound of other structures, for example, silicone, NBR, SBR and BR, and dimer acid, etc. can also be used together.

[0012] In this invention, as phenol resin which can be used together with the above-mentioned polyamide resin, the resol mold phenol resin and novolak mold phenol resin of copolycondensation molds, such as the bisphenol A mold with which the phenol component was chosen from bisphenol A and alkylphenol, an alkylphenol mold, or it, are raised, and one sort or two sorts or more of things can be used together. As resol mold phenol resin of an alkylphenol mold, what has a methyl group, an ethyl group, a propyl group, t-butyl, a nonyl radical, etc. is raised at least to o- or p- of a phenolic hydroxyl group. Since these resols mold phenol resin has the operation which reacts with heating, becomes the insoluble and infusible solid-state which has adhesive strength, and raises the adhesive strength of adhesives, insulating dependability, chemical resistance, and thermal resistance, it is desirable. Phenol resin is blended with the loadings of the 5 - 100 weight section to the polyamide resin 100 weight section.

[0013] A maleimide component has at least one or more maleimide radicals as a functional group in a basic frame, and the bismaleimide generally shown by the following general formula is raised.

[0014]

[Formula 1]

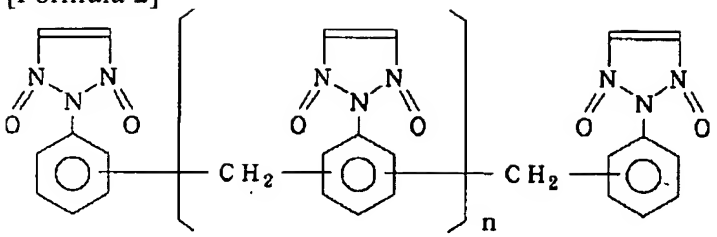


(式中、Rは2価の基を表わす)

[0015] As an example, N and N'-m-phenylene bismaleimide, N, and N'-p-phenylene bismaleimide, N and N'-m-toluylene bismaleimide, N, and N'-m-toluylene bismaleimide, N, N'-4, and 4-biphenylene bismaleimide, N, N'-4, and 4'-[3 and 3'-dimethyl biphenylene] bismaleimide, N, N'-4, and 4'-[3 and 3 DA-dimethyl diphenylmethane] bismaleimide, N, N'-4, and 4'-[3, 3, and - diethyl diphenylmethane] bismaleimide, N, N'-4, and 4'-diphenylmethane bismaleimide, N, N'-4, and 4'-diphenyl propane bismaleimide, N, N'-4, and 4'-diphenyl ether bismaleimide, N, N'-3, and 3'-diphenyl sulfone bismaleimide, N, N'-4, and 4'-JIFENIKU sulfone bismaleimide etc. can be mentioned.

[0016] In addition, the maleimide resin arranged in the novolak mold which the giant-molecule-ized maleimide resin is mentioned, for example, is shown by the following general formula can be used for a maleimide compound.

[0017]
[Formula 2]



（式中、nは1以上の整数を意味する。）

[0018] In addition, the maleimide which has structures, such as a siloxane and aliphatic series, as a basic frame can also be used. In this invention, one or more sorts of above-mentioned maleimide resin can be used. The above-mentioned maleimide resin can also be used together with said epoxy resin and phenol resin. As for maleimide resin, it is desirable to blend in the range of the 10 - 500 weight section to the polyamide resin 100 weight section. In this case, if maleimide resin is unable to obtain the Young's modulus specified by this invention under in 10 weight sections and the 500 weight sections are exceeded, it will be easy to produce a problem to membrane formation nature, such as generating of crawling of the painted surface.

[0019] In this invention, it is desirable to make an adhesives layer contain an imidazole compound for the purpose of promotion of hardening. A refractory thing etc. is raised to general-purpose solvents, such as what is meltable as an imidazole compound to the general-purpose solvent represented by methyl ethyl ketones, such as 2-methylimidazole and 2-ethyl-4-methylimidazole, and a 2-phenyl-4-benzyl-5-hydroxy imidazole. An imidazole compound can usually be used in the range of 0.03 - 10 weight section to the epoxy resin 100 weight section in a system. In addition, it becomes an excess amount at the purpose which will be hardened if under the 0.03 weight section of hardening is inadequate and 10 weight sections are exceeded. The thickness of the adhesives layer of this invention is 5-30 micrometers more preferably [it is desirable and] than 3-50 micrometers. In this case, in less than 3 micrometers, required adhesive strength is not obtained, but when 50 micrometers is exceeded on the other hand, a possibility of producing a problem is in the bending nature of an adhesives layer.

[0020] As a protective layer of an adhesives layer, a protection film is used, for example, films, such as polyethylene, polyethylene terephthalate, and polypropylene, can be illustrated. Next, the manufacture approach of the tape for TAB of this invention is explained. Drawing 2 shows a production process, and it applies the adhesives of predetermined combination on the (b) protection film 3 so that the thickness after desiccation may become the above-mentioned range. In order to change into a semi-hardening-like condition in that case, the heating condition needs making it dry for 2 minutes at 150-180 degrees C. next, (**) -- the front face of the formed adhesives layer 2 -- the organic insulation film 1 -- superposition and 100 (Ha)-130 degrees C -- 1kg/cm2 Thermocompression bonding is carried out the above condition. (d) The obtained tape for TAB is wound, for example, the thing of die length (30-300m) is obtained by width of face of 30-200mm.

[0021]

[Function] It is the Young's modulus of an adhesives layer [in / on this invention and / 20 degrees C - 300 degrees C] 4x108 dyne/cm2 The tape for TAB which has the bonding-proof property of having excelled in considering as the above in the packaging of the tape for TAB can be offered. That is, to the elevated temperature and high pressure which are applied at the time of bonding, by controlling softening of an adhesives layer, the adhesive strength at the time of an elevated temperature is held, the subduction into a location gap of a lead pattern and the adhesives of a lead pattern is prevented, and mold package mounting of a TAB tape and wire-bonding mounting are further enabled by raising the heat-resistant property of an adhesives layer from the conventional thing. It is the Young's modulus of a 20 degrees C - 300 degrees C adhesives layer 4x108 dyne/cm2 When considering as resin, since the

aforementioned effectiveness is not acquired, it is inadequate.
[0022]
[Example] Hereafter, an example explains this invention. All the "sections" means the "weight section" below.
The coating for adhesives stratification of the following presentation was applied to the protection film which consists of a polyethylene terephthalate film with an example 1 thickness of 38 micrometers, it dried for 2 minutes at 160 degrees C, and the adhesives layer of 20 micrometers of thickness was formed.
[0023]
- Polyamide resin (toe MAIDO TXC-232-C Fuji formation industrial company make)
25% isopropyl alcohol of ** / water mixed solution 50 sections and maleimide resin (MB -8000 Mitsubishi Petrochemical Co., Ltd. make)
20% dimethylacetamide solution of ** 1% methyl-ethyl-ketone solution of 50 sections and 2-ethyl imidazole The 15 sections [0024] Next, it is the insulating film which consists of a polyimide film with a thickness of 50 micrometers to said adhesives layer Superposition, 130 degrees C, and 1kg/cm2 Heating sticking by pressure was carried out on conditions, and the tape for TAB was created. Next, the protection film of the front face of this tape for TAB was exfoliated, 80 degrees C performed 1 uncia electrolytic copper foil (35-40 micrometers in thickness) at lamination and 60 more degrees C for 6 hours, sequential heating was performed at 6 hours and 160 degrees C for 5 hours, and the adhesives layer was hardened. Furthermore, the photoresist film was formed on copper foil with the conventional method, it processed, copper foil was etched, and the pattern of the 100-micrometer thin line was formed and carried out for evaluation. Moreover, after the sample for Young's modulus measurement carried out the laminating only of the 20-micrometer adhesives layer one by one with the elevated-temperature laminator on condition that the speed of 1 m/sec and finally carried out the eight-sheet (20micrometerx8) laminating at 100 degrees C, it was carried out at 60 degrees C for 6 hours, carried out sequential heating at 160 degrees C by 80 degrees C for 5 hours for 8 hours, and hardened adhesives. Then, Young's modulus was measured using the sample made into the predetermined configuration.
[0025] The tape for TAB was created like the example 1 except having used the thing of the following presentation as a coating for example 2 adhesives stratification. Moreover, the sample for characterization was created by the same approach as an example 1.
- Polyamide resin (toe MAIDO TXC-232-C Fuji formation industrial company make)
25% isopropyl alcohol of ** / water mixed solution 50 sections and bismaleimide resin (BMI-MP Mitsui Toatsu Chemicals, Inc. make)
20% dimethylacetamide solution of ** 30 sections and epoxy resin (Epicoat 828 oil-ized shell company make) 5 sections and novolak mold phenol resin (TAMANORU 752 Arakawa chemistry company make)
50% methyl-ethyl-ketone solution of ** 1% methyl-ethyl-ketone solution of 5 sections and 2-ethyl imidazole The 15 sections [0026] The tape for TAB and the tape for characterization for a comparison were created like the example 1 except having used the thing of the following presentation as a coating for example of comparison 1 adhesives formation.
- Polyamide resin (toe MAIDO TXC-232-C Fuji formation industrial company make)
25% isopropyl alcohol of ** / water mixed solution The 100 sections and epoxy resin (Epicoat 838 oil-ized shell company make) 8 sections and novolak mold phenol resin (TAMANORU 752 Arakawa chemistry company make)
50% methyl-ethyl-ketone solution of ** 1% methyl-ethyl-ketone solution of 5 sections and 2-ethyl imidazole The ten sections [0027] (Characterization trial) The following characterization trial was performed to the tape for TAB of examples 1 and 2 and the example 1 of a comparison.
1) The Young's modulus from 20 degrees C to 300 degrees C was measured about the Young's modulus measurement trial examples 1 and 2 and the example 1 of a comparison. In addition, in measurement, it is LEO Vibron. It measured using DDV-II (cage en tech company make) by the oscillation frequency of 110Hz, and the sample programming rate of 3 degrees C / min. A measurement result is shown in

drawing 3 .
[0028] 2) The tape carrier package tape on which the copper foil pattern of the heat-resistant adhesive property width of face of 1cm was formed was fixed so that the tooth back of the insulating film might touch on a 300-degree C hot platen, copper foil was exfoliated at the exfoliation rate of 5 cm/min in the 90-degree direction, and the adhesive strength in that case (the exfoliation force is called) was measured. A result is shown in Table 1.
[0029]
[Table 1]

試料	剥離力（g／cm）
実施例1	200
実施例2	185
比較例1	130

[0030] It was checked that the tape for TAB of this invention shows the outstanding heat-resistant property by the above-mentioned trial so that clearly from drawing 1 and Table 1.
[0031]
[Effect of the Invention] for the adhesive tape for semi-conductors of this invention, the Young's modulus of the adhesives layer after hardening in 20 degrees C - 300 degrees C be 5x108 dyne/cm2. since it have the property, there be a location gap of a lead pattern and subduction into an adhesives layer under the elevated temperature at the time of an inner lead and outer lead bonding, and high pressure at the time of the mounting process of the tape for TAB, and since there be little temperature dependence in the description of a glue line, the fall of the adhesive strength to copper foil and an insulating film do not arise.
[0032] Therefore, it becomes possible to apply the adhesive tape for semi-conductors of this invention to the circuit which carried out densification. Furthermore, when it mounts a multi-pin chip, it is hard to produce a bonding mistake, and in a conveyance process and a bonding process, there is little deformation of a lead and the yield goes up sharply. Moreover, the member with elevated-temperature-proof high-pressure nature using the tape for TAB which can respond to transfer mold mounting and wire-bonding mounting can be offered.

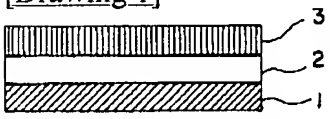
[Translation done.]

* NOTICES *

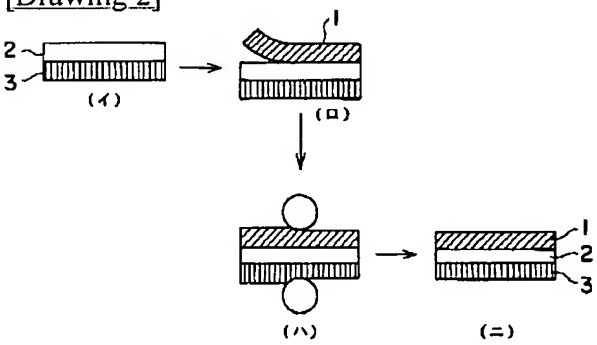
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

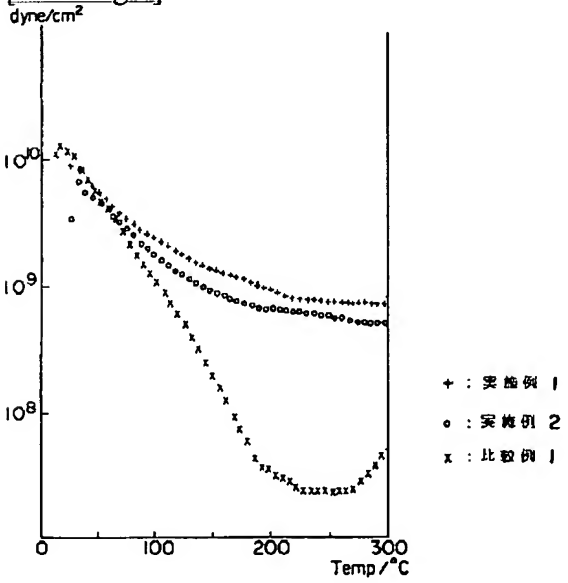
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]

CLAIMS

[Claim(s)]
[Claim 1] The Young's modulus after hardening [in / on the adhesive tape for semi-conductors which comes to prepare an adhesives layer and a protective layer on an insulating film, and / 20 degrees C - 300 degrees C of this adhesives layer] is 4x108 dyne/cm2. Adhesive tape for semi-conductors characterized by being above.
[Claim 2] Adhesive tape for semi-conductors according to claim 1 whose thickness of this adhesives layer is 3-50 micrometers.

[Translation done.]